CHAPTER 5

HELIPAD AND HELIPORT APPROACH LIGHTING SYSTEMS

5-1. General Design

Figure 5-1 through 5-3 and the design criteria set forth herein are intended to serve as a guide in designing and installing a typical helipad or heliport VMC and/or IMC (precision and non-precision) approach lighting systems. Table 5-1 lists the operating categories and the applicable FAA standard or paragraphs of this technical manual pertaining to each facility. Landing directional lights and perimeter lighting systems will he designed in accordance with chapter 4.

5-2. Terminology

The following are definitions of terms used in helipad and heliport lighting systems:

a. Approach direction lights. Two parallel rows of aviation white incandescent lights extending out from the landing direction lights into the approach path a distance of 900 feet.

b. Category 1. Approach lighting system which provides landing minima as low as a 200-foot decision height and one quarter of a mile visibility for a 6 degree approach to a helipad or heliport.

Table 5-1. Operating categories.

FACILITIES	HELIPAD			HELIPORT	REFERENCES
	VMC	IMC		IMC	
	NON INSTRUMENT	NON PRECISION INSTRUMENT	PRECISION INSTRUMENT CATEGORY I	PRECISION INSTRUMENT CATEGORY I	
APPROACH LIGHTING CATEGORY I	O	O	X	X	CHAPTER 5
APPROACH LIGHTING	O	O	X	X	4-3,4-4,CHAPTER 5,10-1A, 10-4B,10-8,10-12,10-13
APPROACH DIRECTION LIGHTS PRECISION NON-PRECISION	 N/A O	 O X	 X N/A	 X N/A	 4-3C,5-2A,5-3B 5-2A,5-3A,10-13C
LANDING DIRECTION LIGHTS	O	X	X	X	4-3B,4-4B,5-2F,10-4B, 10-13C
PERIMETER LIGHTS	X	X	X	N/A	4-3A,4-4A,5-2G,10-13A
FLOODLIGHTS	O	O	O	O	4-3E,4-4E,10-13E
VISUAL GLIDE SLOPE INDICATOR SYSTEM	O	X	X	X	5-2H,7-7
PAD INSET LIGHTS	O	O	O	N/A	4-3D,4-4D,5-2,10-13D
HIGH INTENSITY RUNWAY LIGHTS	N/A	N/A	N/A	X	10-1,10-12A(2)
THRESHOLD LIGHTS	N/A	N/A	N/A	X	3-2A(2),3-2B(2)
RUNWAY END LIGHTS	N/A	N/A	N/A	X	3-2A(2),3-2B(2)
TAXIWAY LIGHTS	O	O	O	X	3-2A(1),6-3B,6-3C,10-6B, 10-6C,10-12C
ILLUMINATED RUNWAY DISTANCE MARKERS	N/A	N/A	N/A	X	AC 150/5345-44
ILLUMINATED TAXIWAY (MOVEMENT AREA) GUIDANCE SIGNS	N/A	N/A	N/A	X	6-3B,AC 150/5345-44
OBSTRUCTION LIGHTING	X	X	X	X	10-7,AC 70/7460-1
ELECTRICAL SUPPLY STANDBY GENERATOR	X	X	X	X	8-7,9-2B,9-2C
HOVERLANE	O	O	X	X	6-3C(3),10-6C
IDENTIFICATION BEACON	X	X	X	X	7-5B,10-7
APRON LIGHTING	N/A	N/A	N/A	X	7-3
EXPLOSION-PROOF LIGHTS	O	O	O	O	3-2C,3-3E,4-3F,4-4F

NOTES: X-REQUIRED
O-OPTIONAL
N/A-NOT APPLICABLE

c. Helipad. A square or rectangle load hearing surface which has a minimum dimension of *40* feet and is designed and designated for the purpose of landing rotary-wing aircraft.

d. Heliport. An airfield consisting of one or more runways not less than *625* feet long and with a 100-foot overrun at each end.

e. Helipad/heliport identification beacon. A beacon used to identify the location of an operating helipad or heliport.

f. Landing direction lights. A set of six aviation yellow lights in a straight line which provides centerline alignment for pilots.

g. Perimeter lights. At least 16 aviation yellow incandescent lights spaced equidistant around the perimeter of the helipad with one light at each corner.

h. Visual glide slope indicators. An approach system using lights and/or filters to provide the pilot with visual reference as to whether or not he is on the proper glide slope.

i. Centerline pad inset lights. Three, aviation blue, semi-flush, 40-watt centerline pad inset lights will be used for pilot alignment with the short IMC non-precision approach lighting system.

5-3. VMC and IMC approach directional lights

Approach directional lights will not be used without landing directional lights. Lamps will be unidirectional 200 watt aviation white throughout the approach lighting system to assure sufficient intensity. Elevated, unidirectional, approach direction light fittings are acceptable throughout the approach system.

a. Configuration for VMC is illustrated in figure 5-1. Approach directional lights will consist of two parallel rows of elevated light fittings, each row *5* feet either side of the helipad extended centerline in the direction of approach. Each row will be spaced on 50-foot centers over a length of 200 feet with the first row located 125 feet from the centerline of the row of perimeter light fittings.

b. Configuration for IMC is illustrated in figure 5-2. The approach lighting system will be symmetrical about and extend for the entire length of the centerline of the helipad directional lights. The system will start at the pad perimeter light as depicted in figure 4-2 and extend out from there for a distance of 1,025 feet. An IMC approach lighting system will normally be installed only at the end of the helipad most frequently used for the approach to the helipad.

5-4. Design

Elevated light fittings will be as light and frangible as possible. The light fittings will be mounted in a horizontal plane or follow the slope of the finished grade. Where a deviation in the axis of the light beam is necessary, a tolerance of plus 2 percent or minus 1 percent in the longitudinal slope is permitted. Where a slope is established the landing direction lights in line with the approach direction lights, the same slope will be continued for the approach direction lights. Luminaire setting angles are determined by the approach angles or angles of descent established for the heliport. Table 5-2 gives the setting angles for the more common approach angles.

5-5. Luminous features

Aviation white approach directional lights will be unidirectional and elevated for a 9-degree light beam peak. The vertical divergence and stages of intensity will be as shown in figure 5-3. The approach lights will have the following intensity characteristics:

a. At plus or minus 7.5 degrees beamspread in the horizontal plane, the light intensity will be 20,000 candelas.

b. At plus or minus 12.5 degrees beamspread in the horizontal plane, the light intensity will be 5,000 candelas.

c. Beamspread in the vertical plane must not be less than 30 percent of the horizontal plane beamspread.

Table 5-2. Luminaire setting angles for given approach angles.

Approach angle (degrees)	*Setting angle (degrees)*
3	6
6	11
9	15

NOTE: If multiple approach angles are to be used, then setting angles should be a mean value for the range of approach angles. For example, if the approach angles are 4 or 8 degrees, the setting angle would 11 degrees.

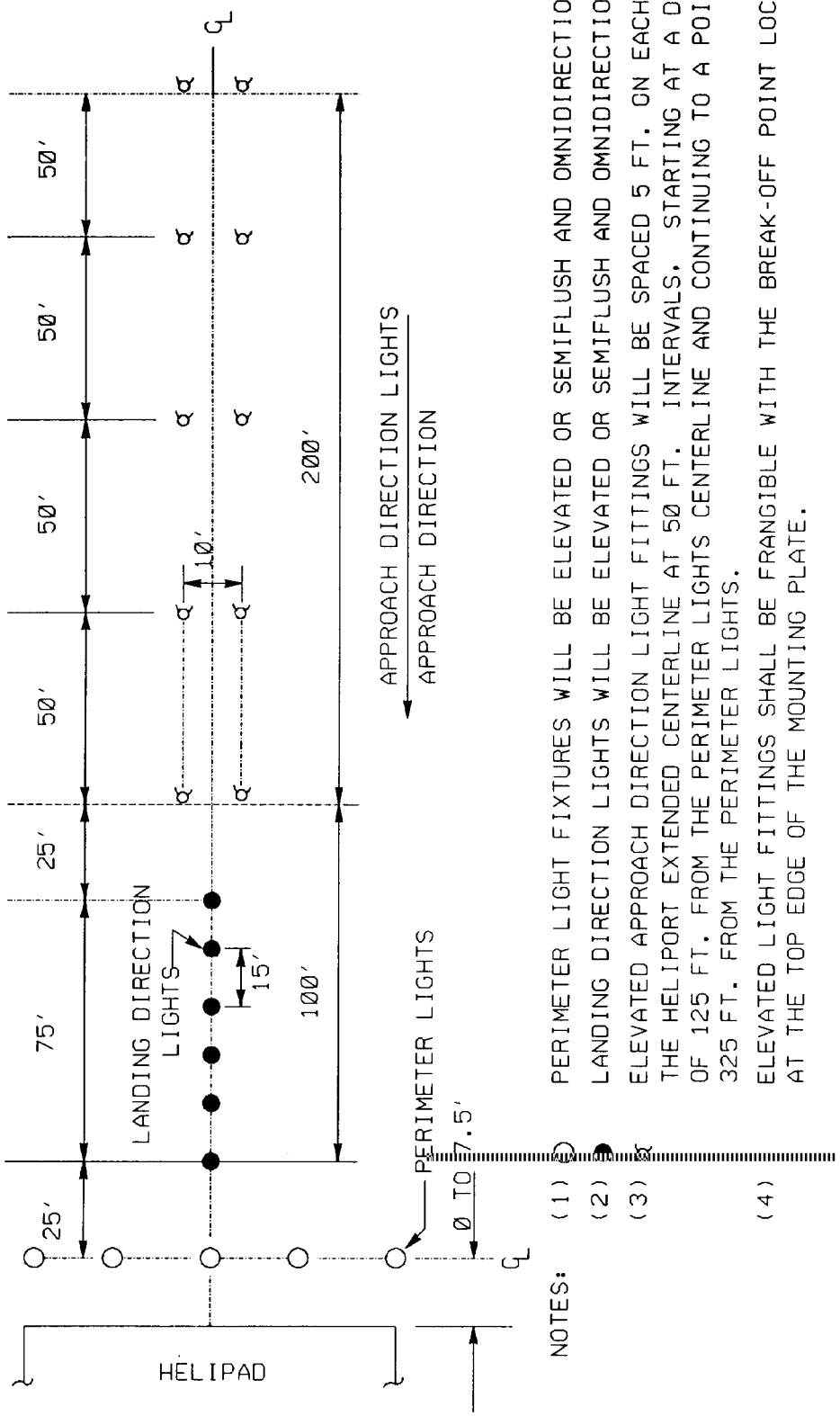
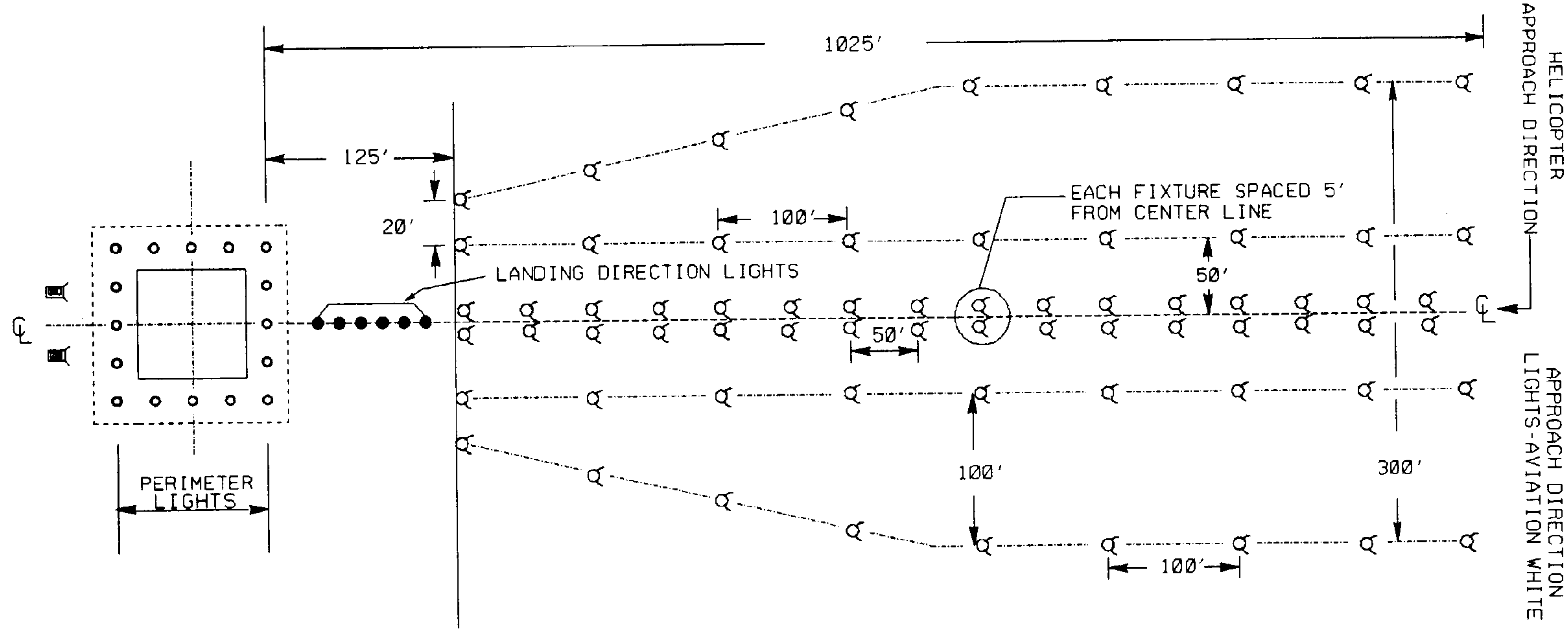


Figure 5-1. VMC configuration



NOTES:

(1) ○ ELEVATED OR SEMIFLUSH OMNIDIRECTIONAL LIGHT FIXTURE WITH LUMINOUS FEATURES.

(2) ● NORMALLY ELEVATED OMNIDIRECTIONAL LIGHT FIXTURES WITH LUMINOUS FEATURES.

(3) VISUAL APPROACH SLOPE INDICATOR SYSTEM.

(4) NORMALLY ELEVATED UNIDIRECTIONAL LIGHT FIXTURES.

(5) ELEVATED LIGHT FITTINGS TO BE FRANGIBLE WITH BREAK-OFF POINT AT TOP EDGE OF BASE MOUNTED PLATE.

(6) LIGHT FIXTURES SHALL BE MOUNTED ON A HORIZONTAL PLANE AND SHALL NOT BE GREATER THAN 18 INCHES ABOVE GRADE OF THE HELIPAD. WHERE DEVIATION OF THE HORIZONTAL PLANE IS NECESSARY, TOLERANCE IS TO BE ·2% OR -1% IN THE LONGITUDINAL SLOPE. WHERE A SLOPE IS ESTABLISHED FOR THE LANDING DIRECTION LIGHTS, THE SAME SLOPE SHALL BE CONTINUED FOR THE APPROACH DIRECTION LIGHTS.

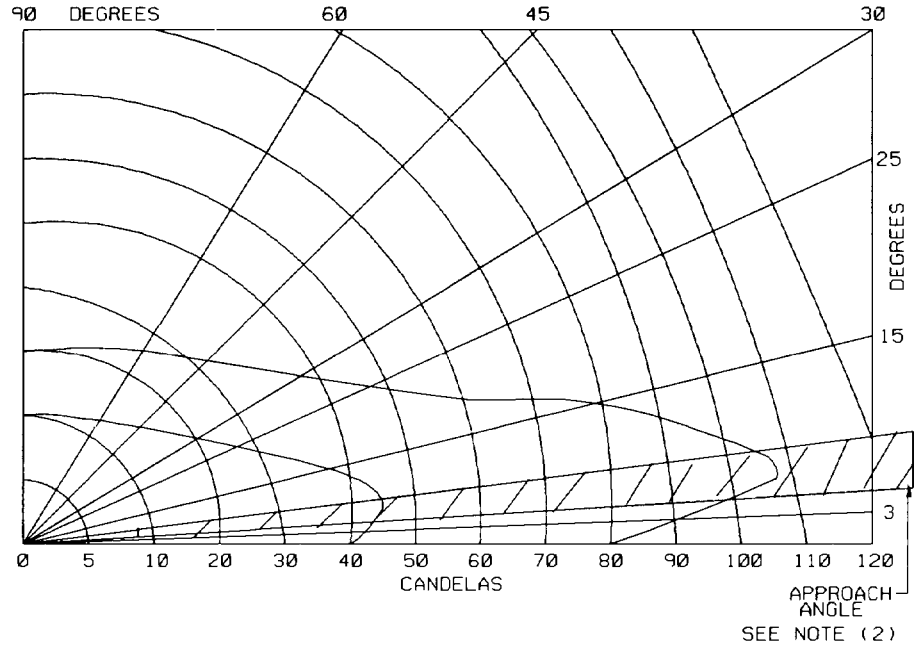
(7) GLIDE SLOPE AND SETTING ANGLES:

GLIDE SLOPE ANGLE	SETTING ANGLE
3 DEG.	6 DEG.
6 DEG.	11 DEG.
9 DEG.	15 DEG.

IF MULTIPLE GLIDE SLOPE ANGLES ARE USED, THE MEAN VALUE OF 11 DEG. SETTING ANGLE SHALL BE USED.

(8) THREE OR FIVE PROGRESSIVE STAGES OF BRILLIANCE ARE REQUIRED FOR APPROACH DIRECTION LIGHTS.
INTENSITIES: A. HORIZONTAL PLANE 20,000 CDS BEAM SPREAD ±7.5°.
B. HORIZONTAL PLANE 5,000 CDS BEAM SPREAD ±12.5°.

Figure 5-2. IMC configuration.



TYPICAL ISOCANDELA DIAGRAM

NOTES: (1) COLOR OF AVIATION YELLOW LIGHT.
CHROMATICITY CO-ORDINATES.
BOUNDARY TOWARD RED Y=0.382.
BOUNDARY TOWARD WHITE Y=0.790-0.667X.
BOUNDARY TOWARD GREEN Y=X-0.120

(2) APPROACH ANGLE 5 DEGREES TO 9 DEGREES.

(3)

VERTICAL DIVERGENCE AND INTENSITY		
MINIMUM AVERAGE FROM	WHITE CANDELAS	YELLOW CANDELAS
3 TO 15 DEG.	100	40
15 TO 25 DEG.	40	15
25 TO 90 DEG.	10	5
ELEVATION OF BEAM PEAK, BETWEEN 7 AND 9 DEG.		

(4)

PROGRESSIVE STAGES OF BRILLIANCE			
AVERAGE FROM		WHITE CAN.	YELLOW CAN.
A	MAX AS SHOWN [P] 3-15 DEG.	100	100
B	30% BRILL (MAX) 3-15 DEG.	30	12
C	2 1/2% BRILL (MAX) 3-15 DEG.	2.5	0.5

(5) ELEVATED OR FLUSH FITTINGS SHOULD GIVEQUIVALENT CANDELAS AS SHOWN.

(6) THE HEIGHT ABOVE THE GROUND OF ELEVATED LIGHTFITTINGS SHALL NOT EXCEED 18 INCHES.

Figure 5-3. Vertical divergence and intensity stages.